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ABSTRACT

This resource work lists metric information published by the U.S. Government and the American National Standards Institute. Also organizations marketing metric materials for education are given. A short table of conversions is included as is a listing of basic metric facts for everyday living. (IS)

ED 090025

Some References on Metric Information

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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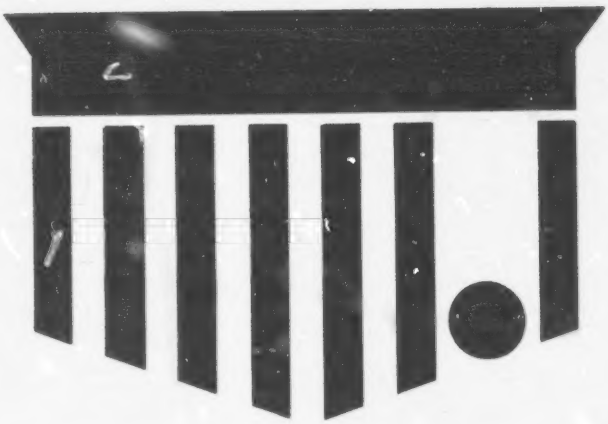
with charts on

- All You Need To Know About Metric
- Metric Conversion Factors



NBS Special Publication 389
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NATIONAL BUREAU OF STANDARDS

SE 017 595

INTRODUCTION

As metric use increases in this country, interest in metric information is also increasing. This booklet was developed to provide a listing of sources for pertinent metric information.

Included is a list of publications produced by the National Bureau of Standards and available from the Superintendent of Documents. Also included is a list assembled by the National Council of Teachers of Mathematics of organizations that market metric materials for educators, and a list of additional sources of metric information.

Thinking meters, kilograms and liters, instead of yards, pounds and quarts, is not a difficult adjustment because the metric units are nearly the same as the customary units they replace. A shopper can buy two meters of fabric instead of two yards, half a kilogram of butter instead of a pound, and a liter of milk instead of a quart.

Without noticing it, we already have "gone metric" in some aspects of our daily living. The shutters of 8, 16 and 35 millimeter cameras click busily across the American countryside. Auto mechanics daily work on foreign cars manufactured in metric countries. Many products carry both customary and metric units on their labels.

Pharmaceutical companies went metric in America over 15 years ago. Currently major companies like IBM, General Motors, Caterpillar Tractor, International Harvester and Honeywell are in the midst of publicly-declared metrication programs. Ford Motor Company is producing automobiles with metric engines. The State of Ohio has begun a changeover to metric by using both kilometers and miles on its road signs. The States of California and Maryland are converting all math and science textbooks used in the public schools exclusively to the metric system.

The prospect of a change to the metric system is something we all should begin to think about. The thinking process won't be very arduous, because all you really need to know about metric for your everyday life is depicted on page 11 of this publication.

U.S. METRIC STUDY PUBLICATIONS

Because of the world trend to metric, Congress asked in 1968 for a sweeping investigation of the metric question. This investigation involved public hearings and surveys of almost every activity of our society – from education and the consumer to international trade and national security.

The findings are available in one summary report and 12 detailed special reports:

A METRIC AMERICA: A DECISION WHOSE TIME HAS COME. D. V. DeSimone, Nat. Bur. Stand. (U.S.) Spec. Publ. 345, 190 pages (July 1971), $2.50 (SD Catalog No. C13.10:345).

INTERNATIONAL STANDARDS (An Interim Report of the U. S. Metric Study). R. D. Huntoon et al., Nat. Bur. Stand. (U.S.) Spec. Publ. 345-1, 145 pages (Dec. 1970), $1.25 (SD Catalog No. C13.10:345-1).

FEDERAL GOVERNMENT: CIVILIAN AGENCIES (An Interim Report of the U. S. Metric Study). R. E. Clark and J. M. Tascher, Nat. Bur. Stand. (U.S.) Spec. Publ. 345-2, 324 pages (July 1971), $2.25 (SD Catalog No. C13.10:345-2).

COMMERCIAL WEIGHTS AND MEASURES (An Interim Report of the U.S. Metric Study). S. L. Hatos, Nat. Bur. Stand. (U.S.) Spec. Publ. 345-3, 109 pages (July 1971), $1.00 (SD Catalog No. C13.10:345-3).

THE MANUFACTURING INDUSTRY (An Interim Report of the U. S. Metric Study). L. E. Barbrow, Coordinator, Nat. Bur. Stand. (U.S.) Spec. Publ. 345-4, 165 pages (July 1971), $1.25 (SD Catalog No. C13.10:345-4).

NONMANUFACTURING BUSINESSES (An Interim Report of the U. S. Metric Study). E. D. Bunten and J. R. Cornog, Nat. Bur. Stand. (U.S.) Spec. Publ. 345-5, 192 pages (Aug. 1971), $1.50 (SD Catalog No. C13.10:345-5).

EDUCATION (An Interim Report of the U. S. Metric Study). B. D. Robinson, Nat. Bur. Stand. (U.S.) Spec. Publ. 345-6, 209 pages (July 1971), $1.25 (SD Catalog No. C13.10:345-6).

THE CONSUMER (An Interim Report of the U. S. Metric Study). B. D. Rothrock, Nat. Bur. Stand. (U.S.) Spec. Publ. 345-7, 146 pages (July 1971), $1.25 (SD Catalog No. C13.10:345-7).

INTERNATIONAL TRADE (An Interim Report of the U. S. Metric Study). G. F. Gordon, Nat. Bur. Stand. (U.S.) Spec. Publ. 345-8, 181 pages (Aug. 1971), $1.50 (SD Catalog No. C13.10:345-8).

DEPARTMENT OF DEFENSE (An Interim Report of the U. S. Metric Study). L. E. Barbrow, Coordinator, Nat. Bur. Stand. (U.S.) Spec. Publ. 345-9, 125 pages (July 1971), $1.25 (SD Catalog No. C13.10:345-9).

A HISTORY OF THE METRIC CONTROVERSY IN THE UNITED STATES (An Interim Report of the U. S. Metric Study). C. F. Treat, Nat. Bur. Stand. (U.S.) Spec. Publ. 345-10, 306 pages (Aug. 1971), $2.25 (SD Catalog No. C13.10:345-10).

ENGINEERING STANDARDS (An Interim Report of the U. S. Metric Study). R. D. Stiehler, Nat. Bur. Stand. (U.S.) Spec. Publ. 345-11, 257 pages (July 1971), $2.00 (SD Catalog No. C13.10:345-11).

TESTIMONY OF NATIONALLY REPRESENTATIVE GROUPS (An Interim Report of the U. S. Metric Study). J. V. Odom, Editor, Nat. Bur. Stand. (U.S.) Spec. Publ. 345-12, 174 pages (July 1971), $1.50 (SD Catalog No. C13.10:345-12).

OTHER METRIC PUBLICATIONS BY NBS

WHAT ABOUT METRIC? Louis E. Barbrow, Nat. Bur. Stand. (U.S.) Con. Infor. Ser. 7 (1973) 80 cents (Stock No. 0303-01191).

BRIEF HISTORY OF MEASUREMENT SYSTEMS WITH A CHART OF THE MODERNIZED METRIC SYSTEM. Nat. Bur. Stand. (U.S.) Spec. Publ. 304A, 3 pages (1972), 30 cents (SD Catalog No. C13.10:304A).

WALL CHART OF THE MODERNIZED METRIC SYSTEM (Color). Nat. Bur. Stand. (U.S.) Spec. Publ. 304, 1 page (1972) 55 cents (SD Catalog No. C13.10:304).

UNITS OF WEIGHT AND MEASURE – – INTERNATIONAL (METRIC) AND U. S. CUSTOMARY; DEFINITIONS AND TABLES OF EQUIVALENTS. Nat. Bur. Stand. (U.S.) Misc. Publ. 286, 251 pages (1967), $2.25 (SD Catalog No. C13.10:286).

THE INTERNATIONAL SYSTEM OF UNITS (SI). Nat. Bur. Stand. (U.S.) Spec. Publ. 330, 42 pages (1972), 30 cents (SD Catalog No. C13.10:330/2).

METRIC CONVERSION CARD (pocket card). Nat. Bur. Stand. (U.S.) Spec. Publ. 365 (1972), 20 cents domestic postpaid, or 10 cents GPO Bookstore (SD Catalog No. C13.10:365/2).

FOR GOOD MEASURE: COMPARE METRIC AND CUSTOMARY UNITS (pocket ruler). Nat. Bur. Stand. (U.S.) Spec. Publ. 376 (1972), 10 cents (SD Catalog No. C13.10:376).

GENERAL PHYSICAL CONSTANTS (pocket card). Nat. Bur. Stand. (U.S.) Spec. Publ. 344 (1971), 10 cents each or $6.25 per 100 (SD Catalog No. C13.10:344).

ELECTRICAL ENGINEERING UNITS AND CONSTANTS (pocket card). Nat. Bur. Stand. (U.S.) Spec. Publ. 368 (1972), 10 cents each or $6.25 per 100 (SD Catalog No. C13.10:368).

Instructions for Obtaining Material Listed. – Government publications listed can be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402; U. S. Department of Commerce Field Offices, or the National Technical Information Service, Springfield, Virginia 22151.

Where an SD Catalog Number or Stock Number is listed after a publication, include this number when you order. Unless you have an account with the office from which you are ordering a publication(s), **please include your remittance with the order.**

The prices quoted are for delivery to addresses in the continental United States and its territories and possessions, and in certain foreign countries that extend the franking privilege.

In the case of all other countries, one-fourth the cost of the publication should be added to cover postage. Remittances should be made either by five-cent coupons (obtainable from the Superintendent of Documents and good until used), or by check or money order payable to the "Superintendent of Documents," and transmitted with the order. **Do Not Send Postage Stamps.**

• • • AVAILABLE FROM ANSI

Six informative publications dealing with the metric system and/or metric conversion may be ordered individually or as a set from the American National Standards Institute (ANSI), 1430 Broadway, New York, New York, 10018. The publications and their individual copy prices are as follows:

ORIENTATION FOR COMPANY METRIC STUDIES (Mechanical Products Industry), 2nd Edition: the nation's first metric guide, revised March 1, 1970, to include standard parts and materials. $1.00 each.

MEASURING SYSTEMS AND STANDARDS ORGANIZATIONS: a 45-page illustrated booklet on measuring systems past, and present, and the role played in this field by national and international standards organizations. $1.25 each.

ISO STANDARD 1000, SI UNITS AND RECOMMENDATIONS FOR THE USE OF THEIR MULTIPLES AND OF CERTAIN OTHER UNITS. $1.50 each.

GUIDE TO IMPACT OF METRIC USE ON STANDARDS DEVELOPMENT IN COMPANIES, TRADE ASSOCIATIONS, TECHNICAL & PROFESSIONAL SOCIETIES: a manual for assessment of priorities and long-range planning for development of standards required for any change in units of measure. $1.00 each.

AMERICAN NATIONAL STANDARD METRIC PRACTICE GUIDE: Z210.1-1973 (ASTM E380-72)*: this newly-approved American National Standard provides guidance on conversion from U. S. customary units to SI units of quantities in general use. $1.50 each.

ANTITRUST IMPLICATIONS OF METRIC CONVERSION: a concise analysis of problems that may be encountered under a number of varying recommendations for national metric conversion. $2.00 each.

Quantity Discounts on Complete Sets

1-49 sets .... $5.50 each
50-99 sets .... $4.50 each
100 or more .... $4.00 each

*Also available by purchase from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103. $1.50 a copy, minimum order $3.00.

ORGANIZATIONS MARKETING METRIC MATERIALS FOR EDUCATORS

List courtesy of the National Council of Teachers of Mathematics

KEY: (B) Books or pamphlets, (F) Films or filmstrips, (K) Kits, (P) Posters, (I) Other instructional aids.

A. Balla & Co., 3494 North Ocean Boulevard, Fort Lauderdale, FL 33308 (I)

Activity Resources Company, Inc., Box 4875, Hayward, CA 94545 (B)

Allyn & Bacon, 470 Atlantic Avenue, Boston, MA 02210 (B)

American Association of School Librarians, 1201 Sixteenth Street, N. W., Washington, D. C. 20036 (B)

American National Standards Institute, 1430 Broadway, New York, NY 10018 (B,P)

Behavioral Research Laboratory, P. O. Box 577, Palo Alto, CA 94302 (B)

BFA Educational Media, 2211 Michigan Avenue, Santa Monica, CA 90404 (F)

Central Instrument Company, 900 Riverside Drive, New York, NY 10032 (I)

Channing L. Bete Company, Inc. 45 Federal Street, Greenfield, MA 01301 (B)

Charles E. Merrill Publishing Company, 1300 Alum Creek Drive, Columbus, OH 43216 (B)

Compu-Data Services, Inc., 16 Sherman Street, P. O. Box 471, Wayne, NJ 07470 (I)

Coronet Films, 65 East South Water Street, Chicago, IL 60601 (B,F)

Creative Publications, P. O. Box 10328, Palo Alto CA 94303 (I)

C-Thru Ruler Company, 6 Britton Drive, Bloomfield, CT 06002 (I)

Cuisenaire Company of America, 12 Church Street, New Rochelle, NY 10805 (I)

Dick Blick Co., P. O. Box 1267, Galesburg, IL 61401 (I)

Dominie Pty Ltd., 8 Cross Street, Brookvale, Australia 2100 (B,P)

Edmund Scientific Co., 380 Edscorp Building, Barrington, NJ 08007 (K)

Educational Teaching Aids, 159 West Kinzie Street, Chicago, IL 60610 (I)

Encyclopedia Britannica Educational Corporation, 425 North Michigan Avenue, Chicago, IL 60611 (K)

Eye Gate House, Inc., 146-01 Archer Avenue, Jamaica, NY 11435 (F)

Grolier Educational Corporation, 845 Third Avenue, New York, NY 10022 (B,I)

Houghton Mifflin Company, 110 Tremont Street, Boston, MA 02107 (B,I)

Ideal School Supply Company, 11000 South Lavergne Avenue, Oak Lawn, IL 60453 (F,I)

Instructor Publications, Inc., (The), Instructor Park, Dansville, NY 14437 (B,P)

International Business Machines Corporation, Old Orchard Road, Armonk, NY 10504 (I)

International Tutors, Department A, 22303 Devonshire, Chatsworth, CA 91311 (K)

JEM Innovations, 1568 East 45th Street, Tulsa, OK 74135 (P)

John Colburn Associates, Inc., P. O. Box 187, Lake Bluff, IL 60044 (I)

John Wiley & Sons, Inc., 605 Third Avenue, New York, NY 10016 (B)

Laidlaw Brothers, Thatcher and Madison, River Forest, IL 60305 (B)

Larry Harkness Company, 115 North Princeton Avenue, Villa Park, IL 60181 (K)

Leicestershire Learning Systems, Box 335, New Gloucester, ME 04260 (I)

Library Filmstrips Center, 3033 Aloma, Wichita, KS 67211 (F)

MacLean-Hunter Learning Materials Co., 481 University Avenue, Toronto 101, Ontario, Canada (Canada only) (I)

McGraw Hill, 1221 Avenue of the Americas, New York, NY 10020 (B,F)

Math Shop, 5 Bridge Street, Watertown, MA 02172 (I)

Metric Aids Limited, 75 Horner Avenue, Toronto 530, Ontario, Canada (I)

Metric Association, Inc., Sugarloaf Star Route, Boulder, CC 80302 (B,I)

Metrix Corporation, P. O. Box 19101, Orlando, FL 32814 (I)

Midwest Publications Co., Inc., P. O. Box 129, Troy, MI 48084 (B)

Mind/Matter Corp., P. O. Box 345, Danbury, CT 06810 (I)

Moyer Vico Limited, 25 Milvan Drive, Weston, Ontario, Canada M9L 1Z1 (I)

National Aeronautics and Space Administration, Projects Office, S&E - ASTR - B/Building 4487 Marshall Space Flight Center, AL 35812 (B)

National Council of Teachers of Mathematics, 1906 Association Drive, Reston, VA 22091 (B,I,P)

National Education Association, American Education Week, P. O. Box 327, Hyattsville, MD 20781 (B)

National Microfilm Association, Suite 1101, 8728 Colesville Road, Silver Spring, MD 20910 (I,P)

National Science Teachers Association, 1201 Sixteenth Street, NW, Washington, D.C. 20036 (B,K)

National Textbook Company, 8259 Niles Center Road, Skokie, IL 60076 (B)

National Tool, Die & Precision Machining Association, 9300 Livingston Road, Washington, D. C. 20022 (B)

NBC Education Enterprises, 30 Rockefeller Plaza, New York, NY 10020 (F)

Pathescope Educational Films, Inc., 71 Weyman Avenue, New Rochelle, NY 10802 (F,I)

Pickett Industries, P. O. Box 1515, Santa Barbara, CA 93102 (I)

Polymetric Services, 4600 Brewster Drive, Tarzana, CA 91356 (I,P)

Random House, The School Division, Westminster, MD 21157 (B)

Realty Facts, P. O. Drawer 449, Warwick, NY 10990 (I)

Robie Sales Company, 2755 Woodshire Drive, Hollywood, CA 90068 (I)

Rowsey Enterprises, P. O. Box 666, Friendswood, TX 77546 (I)

Sargent-Welch Scientific, 7300 North Linder Avenue, Skokie, IL 60076 (I,P)

Science Service, 1719 N Street, NW, Washington, D.C. 20036 (I,K)

Selective Educational Equipment, Inc., 3 Bridge Street, Newton, MA 02195 (I)

Sigma Scientific, Inc., P. O. Box 1302, Gainesville, FL 32601 (I)

Society for Visual Education, Inc., 1345 Diversey Parkway, Chicago, IL 60614 (F)

Spectrum Educational Ltd., 9 Dohme Avenue, Toronto, Ontario, Canada (I)

Sterling Publishing Company, Inc., 419 Park Avenue, South, New York, NY 10016 (B)

Swani Publishing Company, Box 248, Roscoe, IL 61073 (B,I,K,F)

Teach'em Inc., 625 North Michigan Avenue, Chicago, IL 60611 (I)

Union Carbide Corp., Public Relations Department, 270 Park Avenue, New York, NY 10017 (I)

Note: This list is based on a compilation (Sept. 1973) by the National Council of Teachers of Mathematics. Recommended changes, deletions, or additions to this list are welcomed by the Council and NBS.

ADDITIONAL SOURCES OF METRIC INFORMATION

Two NBS metric items--the Modernized Metric System (wall chart in color) and the Metric Conversion Card (wallet card)--have been reprinted by the training and recruiting services of the Department of the Army for school distribution. These are available free upon request from your nearest Army school representative.

The following organizations may be contacted for additional material as indicated.

Metric Association, Sugarloaf Star Route, Boulder, Colorado 80302. Distributes some educational material and publishes a quarterly newsletter, available to its members (annual dues are $3).

National Council of Teachers of Mathematics, 1906 Association Drive, Reston, Virginia 22091.

National Science Teachers Association, 1201 Sixteenth Street, N.W., Washington, D.C. 20036.

Metrication Task Group, George C. Marshall Space Flight Center, Huntsville, Alabama 35812.

American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103. Publishes assorted aids to metrication.

American National Metric Council, 1625 Massachusetts Avenue, N.W., Washington, D.C. 20036. A group newly established under the auspices of the American National Standards Institute to provide guidance to industrial and commercial segments of society.

Construction Industry Training Board, Publication Distribution Section, Radnor House, London Road, Norbury, London SW16 4EL England. CITB produced a much-seen set of "Think Metric" wall posters.

The several national metric conversion boards can supply general information about conversion in their respective countries and also provide referrals to other organizations therein. Their addresses are listed below.

Metrication Board
22 Kingsway
London WC2B 6LE England

Metric Commission
320 Queen Street
Ottawa K1A OH5 Canada

Metric Conversion Board
18-24 Chandos Street
St. Leonards, N.S.W. 2065 Australia

Metric Advisory Board
P. O. Box 10-243
The Terrace
Wellington, New Zealand

South African Bureau of Standards
Private Bag X191
Pretoria, South Africa

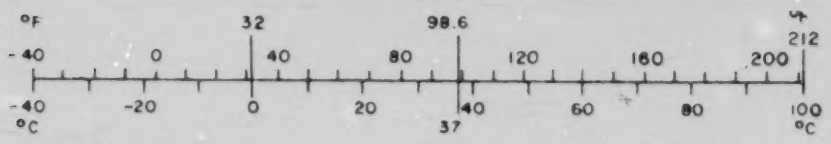
U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS
WASHINGTON, D.C. 20234

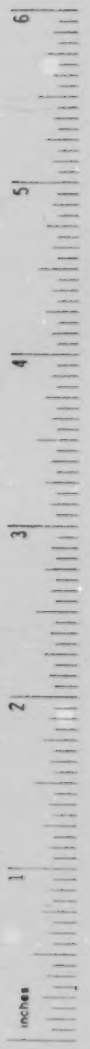
NBS Letter Circular 1051
July 1973

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C





*1 in = 2.54 cm (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10: 286.

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
	AREA			
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
	VOLUME			
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
	TEMPERATURE (exact)			
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

This Letter Circular (LC1051) provides conversion factors for going from the more common customary units to metric units and vice versa. It may be reproduced freely. LC1051 is based on NBS Special Publication 365 (Revised Nov. 1972), "Metric Conversion Card", available by purchase as a wallet-size plasticized card from the U.S. Government Printing Office, Superintendent of Documents, Washington, D.C. 20102. Price 20 cents domestic postpaid, or 10 cents GPO Bookstore. Stock Number 0303–0168. Catalog No. C13.10: 365/2. (25 percent discount on orders of 100 or more copies).

All You Will Need to Know About Metric

(For Your Everyday Life)

10

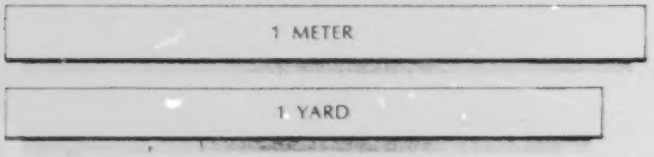
Metric is based on Decimal system

The metric system is simple to learn. For use in your everyday life you will need to know only ten units. You will also need to get used to a few new temperatures. Of course, there are other units which most persons will not need to learn. There are even some metric units with which you are already familiar: those for time and electricity are the same as you use now.

BASIC UNITS

METER: a little longer than a yard (about 1.1 yards)
LITER: a little larger than a quart (about 1.06 quarts)
GRAM: about the weight of a paper clip

(comparative sizes are shown)



25 DEGREES FAHRENHEIT

25 DEGREES CELSIUS

COMMON PREFIXES

(to be used with basic units)

Milli: one-thousandth (0.001)
Centi: one-hundredth (0.01)
Kilo: one-thousand times (1000)

For example:
1000 millimeters = 1 meter
100 centimeters = 1 meter
1000 meters = 1 kilometer

1 LITER

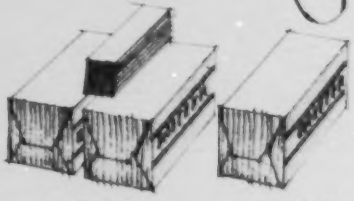
1 QUART

OTHER COMMONLY USED UNITS

Millimeter:	0.001 meter	diameter of paper clip wire
Centimeter:	0.01 meter	width of a paper clip (about 0.4 inch)
Kilometer:	1000 meters	somewhat further than ½ mile (about 0.6 mile)
Kilogram:	1000 grams	a little more than 2 pounds (about 2.2 pounds)
Milliliter:	0.001 liter	five of them make a teaspoon

OTHER USEFUL UNITS

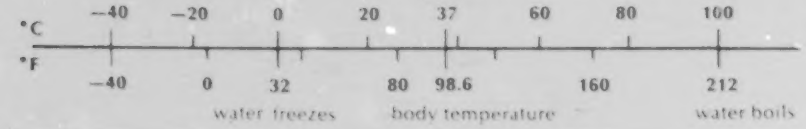
Hectare: about 2½ acres
Tonne: about one ton



1 KILOGRAM 1 POUND

TEMPERATURE

degrees Celsius are used



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Richard W. Roberts, *Director*

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Nat. Bur. Stand. (U.S.), Spec. Publ. 389,
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